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IFFN (IDENTIFICATION FRIEND FOE OR NEUTRAL) REPORT
PHASE I DESIGN(U) JOINT TEST FORCE KIRTLAND AFB NM
IDENTIFICATION FRIEND FOE OR NEUTRAL 1983

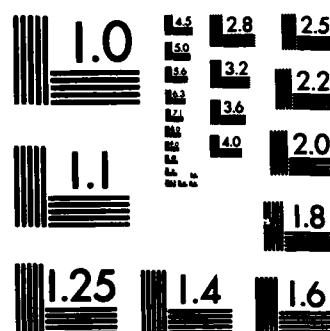
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IDENTIFICATION FRIEND, FOE, OR NEUTRAL JOINT TEST FORCE
KIRTLAND AIR FORCE BASE, NEW MEXICO 87117

AD - A133702

10 AUG 1983

REPLY TO
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JTD

SUBJECT

Phase I Report

TO

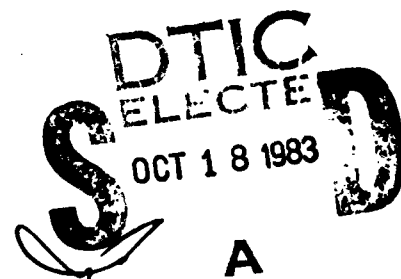
Colonel Jellett

1. The attached report, although late, summarizes IFFN ETS Phase I Design activities. In general, Phase I met its objectives of developing design specifications and identifying risks in system specifications.
2. Our main goal from an overall program standpoint during the ETS Phase II installation activity will be to obtain agreement on program baseline and a finalized test design. This should better stabilize IFFN technical, schedule, and costs areas.
3. Distribution of this Phase I Report has been limited to IDA and DDT&E. If you believe other agencies should receive a copy of this report, let us know and we shall make appropriate distribution.
4. Please contact Lt Col Floyd Smith, Autovon 244-5293, if you require any additional information.

SIGNED

WILLIAM R. DAVIS, Col, USAF
Joint Test Director

1 Atch
Phase I Report



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ATTACHMENTS

1. Program History and Authority
2. Phase I Milestones

SECTION I - BACKGROUND.

A. Purpose.

The Identification Friend, Foe, or Neutral Joint Test and Evaluation (IFFN JT&E) is directed by the Director, Defense Test and Evaluation, Office of the Under Secretary of Defense for Research and Engineering (OUSDRE/DDT&E). The purpose is to assess baseline US capabilities within the NATO Air Defense Command and Control System to perform the IFFN function; identify deficiencies in the performance of that function; and define near-term procedural and equipment modifications for future testing. The concept for testing is to replicate, through a computerized testbed, operational weapon and command and control system configurations in the 1985 - 1990 timeframe. The concept is centered on live operators using actual tactical hardware or simulators with realtime computer models to stimulate the equipment as well as provide stress, background loading, and added sources of identification inputs. To implement this concept, a geographically distributed testbed is to be established with a central facility that will control/direct the equipment.

Actual testing is conducted in a series approach progressing through a vertical slice of an air defense system. Within each series, the test node or nodes will be examined under a matrix of conditions designed to stress different aspects of the identification problem.

Attachment one presents the IFFN program history and authority. Attachment two depicts the major Phase I milestones.

B. Technical Approach.

The technical approach to accomplish these objectives was to generate a testbed design specification based on an Institute for Defense Analyses (IDA) - developed Test Design. The design specification became the technical statement of requirements for the competitive acquisition of the design, installation, test, and support of the IFFN Evaluation Testbed System (ETS). The subject acquisition will consist of four phases: Phase I - Design (completed), Phase II - Installation (Stages 1-3), Phase III - Installation (Stages 4-6), and Phase IV - Installation (Stages 7-8). The contract strategy included the competitive award for Phase I, exercise of an option for Phase II, and addition of Phase III and IV pursuant to supplemental agreements at some future date of the contract effort.

The purpose of the Phase I - Design was to develop prime item development specifications to a point at which a functional baseline would be established and all risks identified in the system specifications would be addressed analytically through hardware, software, and interface development specifications. In other words, the Design Phase was to reduce the risk to the government by delaying approval for the fabrication/installation phases until much of the design work had been accomplished on the testbed. In this manner, the government would not be contractually committed to a long-term design, fabrication, and installation effort without the feasibility of the design to achieve the overall program technical

objectives being proven. The major products of the Design Phase were development (B-level) specifications and supporting design data.

A Cost Plus Award Fee contract for \$1.2 million (later modified to \$3.2 million) for Phase I was awarded to LOGICON, Inc. on 15 Sep 81. The Phase I - Design effort ended on 31 Oct 82. On 1 Nov 82, the Phase II Option was exercised for the fabrication and installation of Stages 1-3.

SECTION II - PROGRAM DEFINITION.

A number of formal documents (Program Management, Operational Requirements, Test Design, Test Plans, Acquisition Plans) are required by regulation (or custom) in a program development effort. These documents provide overall program direction and guidance to include the tasks and resources required to accomplish the Test Directive. The program definition has been laid out in several documents and has undergone review by several independent agencies to help further define program requirements. The following discussion reviews the program definition process.

A. Initial Definition Activity.

The IFFN Evaluation Program was defined in an IDA Test Design Concept Definition Report submitted in Aug 79. The Director, Defense Test & Evaluation (DDT&E) assigned IDA the task of writing the IFFN Test Design, based on the Test Design Concept. The Test Design was to be completed within one year and cover the entire test. This document was to be the initial document on which the testbed specifications (Type A), testbed design, and test plans would be written.

The JTF program office was initially tasked to generate a testbed specification based on a DDT&E-approved IDA Test Design. Unfortunately, the impetus to get the testbed development underway overshadowed the development of program baseline documents (Program Master Plan, Testbed Operational Requirements Document, Test Design, and associated management plans). As a result, the testbed acquisition specification has tended to drive the user requirements. Thus, the focal point of the JTF has been to acquire a testbed to perform testing as delineated in the system specification and not the Test Design. However, the acquisition of a testbed continues despite the lack of overall Test Design baseline definition and has been able to meet all requirements.

B. Test Design.

Service comments have had major impact on the Test Design. When the Services reviewed the Test Design (Jan 81 version), they stated that the document was too long and was not organized in a manner that would provide a clear understanding of the test. The Services were unanimous in their opinion that the testing period was too long and results would not be received within an acceptable period of time.

During a working group session between IDA and the IFFN JTF (Jul 81), the Test Design was reorganized into four volumes, a program overview and three

blocks of testing. The three blocks of testing roughly correspond to separate Service involvement (Block I, Army Air Defense and Command and Control (C²); Block II, Air Force interceptors and C²; Block III, Navy and Marine Corps participation). Further, different methods of compressing the acquisition and testing schedules were considered. This led to the publication of the newly formatted Test Design draft, published in Aug 81.

By the latter part of Sep 81, it was determined that sufficient funds would not be available to support an accelerated acquisition schedule. This caused another redraft of the Test Design (Jan 82).

In Mar 82, Block II of the Test Design was delivered in draft. During this month, both Blocks I and II were presented to the Technical Advisory Board (TAB) for their consideration.

The comments of the TAB were folded into the design effort and a smooth draft of the Program Overview and Blocks I and II were published (Apr 82).

In May 82, these smooth drafts were sent to the Services for coordination.

In Jul 82, the Senior Advisory Council (SAC) advised DDT&E to approve the start of the acquisition of the testbed. DDT&E granted approval for acquisition of the testbed.

Also in Jul 82, Phase I of the contract was extended so that Service comments could be received and an independent study by the Applied Physics Lab (APL) of Johns Hopkins University could be reviewed to determine the impact on testbed acquisition.

The APL report and Service comments were received in Aug 82. In Oct 82, several working meetings were held between IDA and the IFFN JTF to incorporate the recommendations provided by the Services and the APL report. It was decided during these meetings to test PATRIOT first and to place more emphasis on the C² portions of the test. The testing period was still considered to be too long and options for reducing the length of the test are being considered. The Test Design is being rewritten to incorporate recommended changes.

The impact of not establishing a Test Design baseline may be exemplified by the technical, schedule, and cost extensions of the Phase I Design effort. The initial contract award was for \$1.2 million for an 8½-month effort. The Phase I effort concluded after 13½ months and at a cost of \$3.2 million. Additionally, the Test Design is still in draft and may cause further perturbations in the Phase II program schedule.

C. Program Reviews.

During this period the IFFN Program, at the direction of DDT&E, underwent several major reviews designed to enhance program definition. First, the TAB, consisting of high-level scientists from the Services, was convened by OSD to address the overall purpose, scope, and objectives of the program. After the TAB review, the APL, of Johns Hopkins University, conducted an independent review of the programmatic and technical aspects of the program. Finally, SAC, a

permanent standing joint OSD and Service advisory forum to the DDT&E on Joint Test & Evaluation (JT&E) matters reviewed the program in Jul 82.

1. Technical Advisory Board (TAB). In Mar 82, the TAB reviewed the IFFN JTF to assess the potential benefits in answering critical questions on indirect IFF and support to future Service programs, the viability of the approach taken and inherent technical risks, and the scope and structure of the program. Their evaluation centered on an apparent discrepancy between the scope of the IFFN program and the capability of the ETS. They generally concluded that the scope of the IFFN program was too narrow to support the size of effort and capability reflected in the capability of the ETS design. They also concluded that the test and acquisition schedule will not support near-term acquisition of IFFN systems, but that an air defense command and control test facility of the capability of the ETS was essential to adequate long-term joint planning. They recommended continuation of ETS construction and expansion of scope to the broader air defense question. The JTF made no formal response to the TAB conclusions or recommendations. (Reference: Ad Hoc Committee Report to Admiral Linder, 19 Mar 82, IFFN JT&E Program.)

2. Johns Hopkins University, Applied Physics Lab (APL). Immediately after the review by the TAB Ad Hoc Committee, DDT&E commissioned a total in-depth review of IFFN efforts by the Applied Physics Lab of Johns Hopkins University. APL completed its review and published its findings on 15 Aug 82. APL broke its analysis into eight major areas:

- a. Analysis of mission and objectives.
- b. Identifying the called-for test resources to satisfy the objectives.
- c. Comparing test resources to the mission and objectives.
- d. Assessing the technical capability of the identified ETS.
- e. Reviewing the test methodology of the test design.
- f. Reviewing the scenario and scripts.
- g. Examining cost and schedule.
- h. Reviewing management parameters.

The APL report was generally critical of IFFN program efforts. The major conclusions were that:

- a. Ambiguities existed regarding the program goals and objectives of IFFN JTF, both in the charter documentation and in the view of Service participants and potential users.
- b. The Joint Test Director (JTD) did not control the ETS technical scope and, therefore, could not guarantee cost and schedule.
- c. The current test design and ETS acquisition schedule resulted in a

late addressal of the joint aspect of the IFFN problem.

- d. The program overstressed weapons systems.
- e. Uncertain technical scope and objectives cause ambiguity.
- f. Cost and schedule were high risk.
- g. Insufficient program management documentation existed.
- h. Numerous technical issues, particularly model and communication representation fidelity requirements, require early resolution.
- i. That other testbeds were insufficiently investigated prior to embarking on ETS construction.

APL recommended the following actions:

- a. Adopt as the objective of the IFFN JTF program "to evaluate the extent to which air defense command and control can aid weapons systems in performing the identification function."
- b. Reorganize the IFFN program to give the JTD control of the technical scope.
- c. Reorient the program to address the command and control system and joint aspects of the problem earlier and with more emphasis.
- d. Establish firmer simulation and representation requirements.
- e. Gather real-world and exercise data to validate ETS results.
- f. Formalize Service support agreements on resources.

At the request of DDT&E, the JTD responded to the APL report. The JTF found the report very useful and concurred with the bulk of the findings. However, we pointed out that acceleration of the test was particularly dependent upon the acquisition schedule, and that accelerating the acquisition schedule would have a serious impact upon the FY83 and FY84 DDT&E budget and increase the technical risk of ETS implementation. We partially concurred with APL's findings on weapons systems emphasis, particularly in their evaluation of the Measures of Effectiveness (MOEs) chosen in the test design. We did not concur that weapons systems representation was being emphasized at the expense of command and control representation. (References: APL Final Report, 13 Aug 82, FS-82-205; IFFN JTF Review of IFFN Evaluation Program Final Report, 8 Oct 82.)

3. Senior Advisory Council (SAC). The SAC (which is the senior JT&E review group) met on 1 Jul 82 to review three current JT&Es and nominations for four additional JT&Es. The SAC reviewed progress reports from the IFFN JTD and preliminary findings from APL. The SAC authorized the JTD to proceed with ETS design and development. DDT&E issued additional program guidance, charging the JTD to seek least-cost solutions toward achieving program goals and constraining

the scope. He specifically directed JTD attention to the fidelity and program emphasis on weapons systems models and the acquisition and checkout of the Central Simulation Facility of the ETS. (References: OUSDRE/DDT&E Memorandum, 6 Jul 82, JT&E SAC; OUSDRE/DDT&E Memorandum, 9 Jul 82, Program Guidance.)

D. Current Definition Activity.

As a result of the reviews, the JTF developed two major goals: (1) establish a process with the Services and the participating agencies, and within the IFFN JTF, to develop the technical requirements for the test facility and the Service systems simulation models that will be included in the test, and (2) conduct a major review of the overall test purpose, objectives, and methodology to address OSD, TAB, APL, and Service concerns.

The first goal has been accomplished by establishing a Model Committee that consists of Service, IDA, and contractor members to assist the IFFN JTF in defining the Service system and test facility modeling requirements. The output of this process is technical direction to the contractor for model development.

The first step of the second goal has been defined. A test concept paper has been outlined that will address Service comments on previous test designs, major findings of the TAB and APL reports, OSD program guidance, and Service participating units requirements. The test concept paper was the basis for a User's Meeting designed to finalize the Test Design and final Service coordination on testing activities.

SECTION III - EVALUATION TESTBED SYSTEM.

A. Acquisition Strategy.

The following strategy was developed in August 1980 to acquire the ETS. The subject acquisition would consist of four phases: Phase I - Design; Phase II - Installation (Stages 1-3); Phase III - Installation (Stages 4-6); and Phase IV - Installation (Stages 7-8). The contract strategy included an award for Phase I, exercise of an option for Phase II, and the addition of Phase III and Phase IV pursuant to a supplemental agreement at some future date of the contract effort. Phase III and IV performance and functional requirements could not be identified at that time and, therefore, the effort could not be reasonably priced to allow incorporation into the request for proposal.

B. Contractor Selection.

The IFFN ETS Request for Proposal (RFP), which contemplated a cost plus award fee contract, was issued pursuant to 10 USC 2304(a) (10) on 20 Feb 81 to nineteen firms based on responses from the draft RFP process. (The Draft RFP was issued on 5 Dec 80.) Two companies submitted timely proposals on 7 Apr 81 (Logicon and Systems Development Corporation).

Evaluations were conducted by the evaluation committee in accordance with

the IFFN Joint Test Director-approved Source Selection Plan (SSP) and the evaluation criteria contained in the RFP. The SSP used AFR 70-15 as a guide in determining the source selection process and criteria. The SSP identified the IFFN JTD as the Source Selection Authority (SSA).

Both proposals were determined to be within the competitive range as a result of the original technical evaluation.

The subject RFP contemplated an award to one or more offerors for Phase I (Design). The rationale was that a multiple award for the design phase would allow the IFFN JTF to have the inherent risks (technical, cost, and schedule) reduced, to have various trade-offs analyzed and refined, and to achieve a more favorable testbed design. The contractor with the better design would then receive the option for Phase II (Installation). However, due to the significant technical difference in terms of design details, understanding of the requirements, proposed architecture, and program plans between the two offerors, the JTD determined a dual award for Phase I would not result in a truly competitive atmosphere and two competitive designs; that is, each equally capable of being implemented for Phase II. The JTF staff also believed that, given the JTF resources, the technical progress of design effort would be seriously hampered due to the need to expend more resources to achieve two sound and competitive designs for Phase II implementation. Such expenditure of resources to enable the competitive design would not be in the Government's interest and would prejudice any competition for the Phase II installation work without achieving the advantages of continuing the competition through the first phase.

Because of the fewer technical and cost uncertainties resulting from the more advanced conceptual design and the probability, under the circumstances, that JTF resources would be more effectively utilized in the monitoring of a single contract, a single award to Logicon was determined as the optimal approach to achieving the goals of the RFP.

The acquisition strategy of a separate first phase of the contract to concentrate on design issues with the follow-on development contingent upon a satisfactory design, proved to be an excellent management tool and incentive to the contractor. It segmented the complex acquisition task into manageable units.

C. Support Contracts.

In Jan 82, two support contracts were let: a technical support contract to SYSCON and an independent verification and validation (IV&V) contract to Science Applications Inc.

1. **Technical Support.** This contract provides for technical and analytical performance in areas related to the ETS implementation, testbed operations, technical/program management, operational requirements definition, test planning, and training.

2. **IV&V.** This contract provides for verification and validation of IFFN ETS software, hardware, and documentation delivery by the ETS contractor.

D. Phase I Acquisition.

Phase I effort consisted of a Preliminary System Design Evaluation (PSDE)

and a Final System Design Evaluation (FSDE). The contractor generated MIL-STD-490 type B¹ and C^{1a} specifications based on the Statement of Work and the Type-A system specifications. The end result of Phase I was an established functional baseline design of the IFFN Evaluation Testbed System.

All data, operational procedures, and techniques generated by this acquisition have been thoroughly documented in technical reports and/or manuals. This information has been acquired with unlimited rights to allow competitive acquisition in the event the installing contractor fails to perform satisfactorily.

An ancillary objective of Phase I was to have the inherent risks (technical, cost, and schedule) and the possibility of trade-offs analyzed and refined prior to selection of a testbed design concept to achieve the overall program technical objectives. This was accomplished to the satisfaction of the JTD. As a result, the option for Phase II was exercised 1 Nov 82.

E. Follow-on Acquisition.

Phase II will consist of the installation, integration, and test of the initial testbed configuration. The phase will be divided into three stages of configuration. Each stage will have a distinct capability to upgrade the testbed. During each stage, the contractor will be required to update the Type-B¹ and C^{1a} specifications developed during Phase I, as well as generate Type-B⁵ and C⁵ specifications. The updated and new specifications will be reviewed at a Preliminary Design Review (PDR) and approved at a Critical Design Review (CDR) for each stage. This activity will ensure that the contractor integrates the various subsystems to meet the Testbed Program technical objectives and documents the changes/upgrades/modifications to maintain configuration control procedures. As such, an allocated baseline can be established and maintained.

Phase III (Stages 4-6) and Phase IV (Stages 7-8) will consist of upgrading the Phase II Testbed to incorporate additional Live Participating Unit (LPU) capabilities. The same activities accomplished during the Phase II stages will be required for each stage in Phase III and IV. The end result of Phase III and IV will be a Testbed system comprised of approximately 13 LPUs and will, thus, be able to replicate all essential elements of the European Air Command and Control System.

SECTION IV - DEVELOPMENT ISSUES.

1. Program test issues, objectives, and test design were still not service coordinated at completion of the design phase causing all pragmatic factors to be extremely high risk.

STATUS: A series of meetings are planned to allow the users (Services) to assist the JTF in finalizing program test issues, objectives, and test design.

2. Concise model requirements definition and service concurrence on model development was difficult to obtain.

STATUS: A model committee comprised of Service experts is planned to assist in establishing model requirements and to facilitate Service acceptance of

the models.

3. Although the JTF personnel were proficient in their technical area, none had experience in an acquisition effort of this size or one with such operational complexity.

STATUS: By the end of Phase I, the necessary learning experience was acquired and Phase II acquisition and planning efforts should be more efficient.

SECTION V - CONCLUSIONS.

In general, Phase I can be fairly assessed as having met its objectives. The contractor mounted outstanding efforts to meet their contractual and design goals. Substantial risk reduction was achieved through design modification and specification development. Finally, government and contractor teams had an opportunity to work together in an atmosphere of intense cooperation.

As with any new and developing program, there were some shortcomings. The most glaring has been the lack of definition of the program baseline and test design. This has caused some element of risk and has left the opportunity for redirection that may cause technical, schedule, and cost perturbations in follow-on phases. The JTF is expending considerable time and resources to establish methodology and procedures to finalize the program baseline and test design.

As we move into Phase II, our first goal is to obtain agreement within the Services and user community on the test philosophy, approach, and scope that will be laid out in the test concept paper as a requisite to finalizing the test design and proceeding into detailed test planning activities. The object of the test concept paper is to accommodate the concerns expressed by the Services and various reviewing agencies, but still remain faithful to the test philosophy outlined in the original feasibility study and JTD charter. Our desire is to ensure that this philosophy is in consonance with the needs of the ultimate consumers of the JTF results.

PROGRAM HISTORY AND AUTHORITY

- March 1976 -** Defense Science Board Task Force recommendation to OSD/DDT&E.
- January 1978 -** IDA Study S-492 (proposal for using exercises, field tests, lab tests, and simulations to evaluate existing IFFN capability). Service comments back to OSD/DDT&E caused redirection of the IFFN effort to a hybrid-simulation program with no field testing initially identified.
- May 1979 -** OSD/DDT&E tasked IDA to develop an IFFN Evaluation Program Concept Definition to include (in briefing format) an overall program plan for meeting the evaluation objectives, including long-lead estimate of total cost. (IDA P-1460, Aug 79.)
- July 1979 -** OUSDRE Memorandum, SUBJ: Charter for Test Director of Joint Test Identification Friend, Foe (established USAF as the Executive Service and JTD with JTF Headquarters at Kirtland AFB, NM).
- July 1979 -** USAF Test Directive for IFFN JT&E.
- July 1982 -** DDT&E authorization to proceed with testbed development.

PHASE I MILESTONES

Concept Definition	Aug 79
Test Design (Draft)	Aug 80
Test Design (1st revision)	Dec 80
Drafts ETS RFP	Dec 80
Test Design (2nd revision)	Jan 81
Final ETS RFP	Feb 81
Sent to Services for Coordination	Feb 81
Received Service Comments	Jun 81
JTF/IDA Working Group on Design	Jul 81
- Study possible test compression	
- Reformat test design into program overview and three blocks of testing (Army, Air Force, Navy)	
Program Overview and Block I Test Design	Aug 81
ETS Contract Let (Phase I)	Sep 81
Revised Program Overview (1st revision)	Dec 81
Final Review Draft Block I (4th revision of HAWK and Revised Program Overview)	Jan 82
IV&V Contract Let	Jan 82
Technical Support Contract Let	Jan 82
Block II Test Design Delivered	Mar 82
Conference Held to Resolve Discrepancies	Mar 82
TAB Conference	Mar 82
IDA Delivered Smooth Draft (5th revision of Block I, 2nd revision of Program Overview, 1st revision of Block II)	Apr 82
Sent to Services for Coordination	May 82
SAC Program Approval	Jul 82
ETS Contract Extended (Phase I)	Jul 82
Received Service Comments and APL Report	Aug 82
- Decision to test PATRIOT first	
- Place more emphasis on C ² portion of test	
IDA Starts Test Design Revision	Aug 82
JTF/IDA Working Group on Design	Oct 82
ETS Contract (Phase I) Completed	Oct 82

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